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THE INDEBTEDNESS

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Photography to Microscopy

BY

A. CLIFFORD MERCER, M.D.,

FELLOW OF THE ROYAL MICROSCOPICAL SOCIETY, LONDON, AND MEMBER OF THE CAMERA CLUB, SYRACUSE, N. Y.

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(A reprint from the *Photographic Times Almanac*, 1887)

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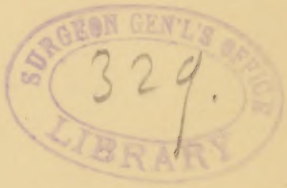

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TO

DR. R. L. MADDOX,

PATIENT AND BUSY IN RESEARCH, STEADFAST AND GENEROUS IN FRIENDSHIP, THIS LITTLE REPRINT IS INSCRIBED.

THE

Indebtedness of Photography to Microscopy

I BELIEVE few persons know that microscopy has materially contributed to some of the more important events in the history of photography, and I trust the readers of this ANNUAL will be pleased to have their attention briefly directed toward that indebtedness.

The first experimenters with surfaces so prepared chemically as to be sensitive to an image formed on them by light passing through the lenses of certain optical instruments were Dr. Thomas Wedgwood*, brother of the famous porcelain manufacturer, and Humphrey Davy, the Sir Humphrey of a later period, who conjointly in 1802 published an account of their experiments in the Journal of the Royal Institution of Great Britain. The prepared surfaces were the surfaces of white paper and white leather sensitized with a solution of nitrate of silver; and the optical instruments, the camera obscura and the solar microscope. That the latter instrument gave more satisfactory results in the hands of the experimenters appears when we are told by Wedgwood that "the images formed by means of the camera obscura have been found to be too faint to produce in any moderate time an effect upon the nitrate of silver" and Davy adds, "I have found that images of small objects produced by means of the solar microscope may be copied without difficulty on prepared paper."†

The Wedgwood-Davy pictures, however, were not fixed and therefore soon faded. The production of a more permanent photograph was delayed for thirty-five years, when, in 1837, Rev. J. B. Reede ‡ of Peckham, England, obtained on paper washed with solutions of common salt and nitrate of silver and an infusion of galls satisfactory photo-micrographs of insects, and sections of vegetables showing cellular and vascular structures. Two years later, in 1839, Reede exhibited more perfect results at a soirée given by the Marquis of Northampton, the President of the Royal Society; and during the same year some of his photo-micrographs were offered

* "A Short History of Natural Science," Arabella B. Buckly. New York, 1881, p. 317.

† *Photography*, "The English Cyclopædia," 1867.

‡ A review of eleven papers on the production of photographs by means of the microscope in *The Medico-Chirurgical Review*. London, July, 1864.

for sale in a bazaar in Leeds. The Reede photo-micrographs were not only the first permanent photographic pictures on paper, but they were also the first photographic pictures on paper offered for sale, and with their appearance in market began a commercial enterprise which has since become far-reaching and important.

Independently of Reede and nearly at the same time, Mr. H. Fox Talbot, in England, also experimented with images projected by means of the solar microscope. His first method, described as photogenic drawing and essentially that of Wedgwood and Davy,* was announced on the 25th of January, 1839, in the presence of the Royal Society. Talbot's second method, the calotype process, was protected by a patent in 1841. In the second process he used the gallo-nitrate of silver development first successfully tried by Reede; and subsequently, and somewhat unjustly, he received full credit for priority in the discovery of the method, apparently because Reede in the opinion of the courts had failed to publish the discovery in a legal manner.† Present interest, however, is in the fact that both discoverers working independently experimented largely with photo-micrographic images and as a result established methods of producing permanent photographic pictures on paper.

Twelve days after Talbot published his first process in England, Daguerre, on the 6th of February, 1839, announced the Daguerreotype process in France,‡ and although authorities at hand say nothing about the use of the solar microscope by Daguerre, Moitessier § states that as early as 1840 Daguerrotype photo-micrographs were produced and presented to the Academy of Sciences in Paris by M. Alphonse Donné, and that in 1845, Donné, with M. Léon Foucault, published an atlas of the microscopic appearances of the fluids of the body, containing numerous plates engraved after Daguerreotype photo-micrographs. The Donné-Foucault plates are superior, both as realistic pictures of microscopic fields and as excellent prints from delicately engraved metal surfaces, and I believe them to be the first plates which were engraved after photographs for the purpose of book illustration.

A contribution to photography of greater importance than any of earlier date was made by Mr. F. Scott Archer and Dr. Hugh Diamond in 1851,‖ when they introduced the pho-

* *Photography*, "The Encyclopædia Britannica," ninth edition, 1885.
† *Ibid.*
‡ *Ibid.*
§ "La Photographie Appliquée aux Recherches Micrographiques." Paris, 1866, p. 4.
‖ "A Treatise on Photography," W. de W. Abney, F.R.S., etc. London, 1878, p. 5.

tographic use of collodion, a use of collodion previously suggested by Le Gray. Archer and Diamond were English workers in photo-micrography,* and although the extent to which they used the microscope in developing the collodion process does not appear, it is reasonable to believe that the images projected by means of the microscope, and familiar to both, proved attractive and useful in the introductory experiments.

The collodion process became a means by which the knowledge and practice of photography spread until in civilized countries there was scarcely a hamlet not more or less familiar with the results of photography. The results, however, were with few exceptions professional. It was reserved for England's highest authority in photo-micrography, while trying to meet the special requirements of photo-micrography, to originate a process which greatly improved, and now applied to both glass and paper, is bringing to the front in addition to the profession an army of amateurs and is destined to be the means of revolutionizing older methods and at the same time enlarging the practice and application of photography to an extent to which a limit can scarcely be imagined. Generous with his discovery, as are all scientific men of highest type, Dr. R. L. Maddox freely published his gelatino-bromide process in *The British Journal of Photography* in 1871 and closed his paper by modestly hoping, little dreaming of all that was latent in the germ he was sowing, that he had given another handle to the photographers' wheel. With exceptional patience and enduring physical suffering, intense at times, Maddox has explored more than the one field of scientific research and brought back fruit. In recognition of his labors in microscopy and photo-micrography, he was elected an Honorary Fellow of the Royal Microscopical Society, has received two medals† and writes his name with the indelible microscopic sunbeam on a bright page in the history of photography.

To recapitulate, photography is apparently somewhat indebted to microscopy for the first fleeting pictures of Wedgwood and Davy, the first methods of producing permanent paper prints, the first offering of paper prints for sale, the first plates engraved after photographs for the purpose of book illustration, the photographic use of collodion, and, finally, wholly indebted for the origin of the gelatino-bromide process, greatest achievement of them all.

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*"How to Work with the Microscope," Lionel S. Beale, F.R.S., etc. London, 1880, p. 287.

† *The British Journal of Photography*, July 25th, 1884, p. 469.